

**Translation**

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>2003P05631WO</b>	<b>FOR FURTHER ACTION</b>	See Form PCT/IPEA/416
International application No. <b>PCT/EP2004/002773</b>	International filing date (day/month/year) <b>17.03.2004</b>	Priority date (day/month/year) <b>16.04.2003</b>
International Patent Classification (IPC) or national classification and IPC		
Applicant <b>SIEMENS AKTIENGESELLSCHAFT</b>		

1.	This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.																								
2.	This REPORT consists of a total of <u>6</u> sheets, including this cover sheet.																								
3.	This report is also accompanied by ANNEXES, comprising: <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>2</u> sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>																								
4.	This report contains indications relating to the following items: <table border="0"> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>	<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input checked="" type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2004/002773

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This report is based on translations from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of:
    - ☐ international search (Rule 12.3 and 23.1(b))
    - ☐ publication of the international application (Rule 12.4)
    - ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
  - ☐ the international application as originally filed/furnished
  - ☒ the description:
    - pages 1, 2, 4-12 as originally filed/furnished
    - pages\* 3, 3a received by this Authority on 28.07.2004 with letter of 27.07.2004
    - pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
  - ☒ the claims:
    - nos. 1-8 as originally filed/furnished
    - nos.\* \_\_\_\_\_ as amended (together with any statement) under Article 19
    - nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
    - nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
  - ☒ the drawings:
    - sheets 1/1 as originally filed/furnished
    - sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
    - sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
  - ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
  - ☐ the description, pages \_\_\_\_\_
  - ☐ the claims, nos. \_\_\_\_\_
  - ☐ the drawings, sheets/figs \_\_\_\_\_
  - ☐ the sequence listing (*specify*): \_\_\_\_\_
  - ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
  - ☐ the description, pages \_\_\_\_\_
  - ☐ the claims, nos. \_\_\_\_\_
  - ☐ the drawings, sheets/figs \_\_\_\_\_
  - ☐ the sequence listing (*specify*): \_\_\_\_\_
  - ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2004/002773

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	1-8	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-8	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-8	YES
	Claims	NONE	NO
2. Citations and explanations (Rule 70.7)			
Reference is made to the following documents:			
D1: LI Y ET AL: "TRANSMITTER DIVERSITY FOR OFDM SYSTEMS AND ITS IMPACT ON HIGH-RATE DATA WIRELESS NETWORKS", IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, IEEE INC. NEW YORK, US, Vol. 17, No. 7, July 1999 (1999-07), pages 1233-1243, ISSN 0733-8716			
D2: DAMMANN A ET AL: "Low complex standard conformable antenna diversity techniques for OFDM systems and its application to the DVB-T system", 4TH INTERNATIONAL ITG CONFERENCE SOURCE AND CHANNEL CODING, BERLIN, GERMANY, 28-30 JAN. 2002, No. 170, pages 253-259, ITG-Fachbericht, 2002, VDE-Verlag, Germany, ISSN 0932-6022			
1. Document D1 is considered to be the prior art closest to the subject matter of claims 1 and 3, and discloses (the references in parentheses are to D1) all the features specified in the preambles of these claims, namely a method for radio transmission of data, <ul style="list-style-type: none"><li>- wherein transmission takes place using a frequency band divided into a plurality of sub-carriers, and using a plurality of antennas,</li><li>- wherein the data is divided into a number of</li></ul>			

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

elements to be transmitted by each antenna, said number corresponding to the number of sub-carriers,

- wherein for each antenna, each element is assigned to a sub-carrier for transmission,
- and wherein at least two antennas transmit different elements on at least one sub-carrier (Chapter II B; figure 1(b)).

2. The subject matter of claims 1 and 3 differs from the known method by virtue of the features specified in the characterising parts of the claims, namely the fact that before OFDM modulation, for each antenna, each element is multiplied by an antenna-specific and element-specific factor, and after OFDM modulation, for at least one antenna, the temporal sequence of the generated signal is altered.

The subject matter of claims 1 and 3 is therefore novel (PCT Article 33(2)).

3. The problem addressed by the present invention can thus be seen as that of how to increase the reliability of OFDM transmission.

4. The solution proposed in claims 1 and 3 involves an inventive step (PCT Article 33(3)) for the following reasons:

Although the features referred to in point 2 above are disclosed in document D2, a combination of the teachings of D1 and D2 is not obvious to a person

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

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PCT/EP2004/002773

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	<p>skilled in the art. There is nothing in either D1 or D2 to suggest combining the respective method described with the method disclosed in the other document. Moreover, none of the other available prior art documents disclose or suggest the special technical features of claims 1 and 3 or state the problem that is to be solved.</p>
5.	<p>The same line of reasoning also applies to independent claim 8. Claim 8 is therefore also novel (PCT Article 33(2)) and involves an inventive step (PCT Article 33(3)).</p>
6.	<p>Claims 2 and 4 to 7 are dependent on claims 1 and 3, and therefore also meet the PCT requirements in respect of novelty (PCT Article 33(2)) and inventive step (PCT Article 33(3)).</p>

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

International application No.

PCT/EP2004/002773

**Box No. VII      Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

The application fails to meet the requirements of PCT Article 6 because claims 1 and 8 are not clear. The claims are not supported by the description (PCT Article 6) because their scope goes beyond what is warranted by the description and drawings. The characterising parts of the claims define an antenna-specific and element-specific factor in general terms, while the description simply discloses a complex phase factor of amount 1 (see, for example, page 5, lines 12 to 22, and page 10, lines 14 to 19).